Component Categories and Codes for Machine- and Non-Machine Insertable Components

DOCUMENT IDENTIFIER: A-SP-ELMF228-00-0000 Rev C, 06-Mar-1992

ABSTRACT: This specification defines categories for PWB-mounted components and the codes within those categories. The codes are intended to indicate the differentiation between parts that could be of significance to the module design and assembly process.

APPLICABILITY: This specification applies to components in part classes 10, 11, 12, 13, 15, 16, 18, 19, 21, and 23. Only those codes listed in this specification are accepted by the Master Parts File.

STATUS: APPROVED 06-Mar-1992; use VTX SMC for current status.

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REVISION HISTORY:	Rev A,	09-Feb-1989	
	Rev B,	15-Mar-1991	ECO Number CTS01
	Rev C,	06-Mar-1992	ECO Number NRO02

Document Management Category:	Modules, Equipment Related (MAME)
Responsible Department:	Technical Services for Manufacturing and Engineering (TME)
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APPROVAL: This document has been reviewed and recommended for approval by the General Review group for its category.

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1 INTRODUCTION

Components in the Master Parts File are assigned an insertion code to facilitate identification of components that can be either automatically or semi-automatically inserted or that have some other mandatory or preferred route within the module assembly process. A module parts list, when released to Manufacturing, has its insertion data processed to segregate and sequence components for machine insertion.

1.1 PURPOSE

This specification defines categories of components and insertion codes within each category for components intended for use with printed circuit boards. It defines categories of components that are not machine insertable, yet compatible with the module assembly process. Categories of components not compatible with the module assembly process are also defined.

1.2 SCOPE

This specification applies to part classes 10, 11, 12, 13, 15, 16, 18, 19, 21, and 23.

This specification defines the process by which new insertability codes are introduced, including procedures for maintenance of all codes. Only those codes listed in this specification are accepted by the Master Parts File.

1.3 RESPONSIBILITIES

1.3.1 Component Engineering

Component Engineering is responsible for assigning codes in the appropriate insertability category. Any changes to assigned insertion codes must be initiated by the responsible component engineer, as outlined in *DEC STD 156-0 Introducing New Purchased Parts and Maintaining Purchased Part Information; Standard Procedure.*

1.3.2 Central Specification Control Systems

Central Specification Control Systems is responsible for adding all insertability codes to the Master Parts File.

2 INSERTABILITY CATEGORIES

All components in part classes 10, 11, 12, 13, 15, 16, 18, 19, 21, and 23 require a 2-character insertability code as part of the new part introduction process. This code identifies the component as belonging to one of these categories:

a. surface mount component

b. Through-hole; machine-insertable

c. Through-hole; hand assembly (not machine-insertable)

d. Through-hole; not process-compatible

2.1 SURFACE MOUNT COMPONENTS

All components designed for surface mounting to a printed wiring board are assigned an appropriate code. The variety of codes within this category is based on attributes such as package type, lead count, lead pitch, and so on. See section 10.

2.2 THROUGH-HOLE; MACHINE-INSERTABLE

The components that are considered machine-insertable in Digital's standard module process are: axial-leaded components of less than 0.200-inch diameter, most dual-in-line packages, and some dual-in-line sockets. The insertion equipment and preparation required may vary according to a number of part and package variables, such as overall dimensions, center-spacing distances, pitch, tooling required, and so forth. These attributes are what the codes are intended to reflect.

2.3 THROUGH-HOLE; HAND ASSEMBLY

Parts that are module-intended and process-compatible, but do not meet Digital's requirements to be machine-insertable, are considered hand assembly parts. Categorization of these parts facilitates the distribution to and setup of semi-automatic workstations used in the assembly process.

2.4 THROUGH-HOLE; NOT PROCESS-COMPATIBLE

The process compatibility requirements for components are listed in *DEC STD 059-0 Incoming Inspection Requirements*. Components that are not compatible must be handled in a separate non-standard process step and need to be identified as such to facilitate distribution, handling, and product costing. Process non-compatibility can be driven by other factors such as the part exceeding a price/risk ceiling, or exceeding one or more dimensions from its general specification. See Table 1 for these codes.

Table 1: Through-hole; Not Process-Compatible Codes

Code	Reason
N	Cannot be cleaned in either solvent or water.
W	Cannot be cleaned in solvent—water only.
XS	Cannot be subjected to wave solder heat.

2.5 DEFAULT CODES

Table 2 contains codes that were default codes assigned by Central Specification Control Systems when no code had been assigned at the time the PNRF was submitted. Parts assigned default codes must be considered in assembly as not process-compatible due to the apparent lack of investigation done on them.

Table 2: Default Codes

Code	Reason
ZZ	Default code for through-hole components.
SM	Default code for surface-mount components.

2.6 DETERMINING INSERTABILITY

Use of a new component requires submitting a Digital Purchased Part Number Request Form. The code designation for the appropriate insertability category is assigned by the Component Engineer. That information is later entered into the Master Parts File with the part number, description, and other data when the form is processed by the Central Specification Control Systems group.

When a new component is introduced into the manufacturing process, its insertability code must be determined. A component with a package designation that matches an existing component type can be encoded with existing codes.

When a component type does not fall into an existing category, a new category must be created by an engineering change order (ECO) to this document.

2.7 PROBLEM SOLVING AND ERROR CORRECTION

Questions about codes, or requests to change the code status of a component should be presented to the plant or commodity component engineer. All changes to insertion codes shall be initiated by the appropriate component engineer.

3 IMPLEMENTING CHANGES TO THIS SPECIFICATION

Insertion codes are used as a key in a variety of Digital software. Various programs use different machine-readable subsets of the information contained in this specification. When this specification is ECOd, the owners of such subsets must be vigilant so as to maintain their application(s) current with the content herein. Due to varied and widespread usage of these codes, it would be beyond the capability of the owner of this specification to keep all potentially affected parties up to date with changes.

4 0.200-PITCH MACHINE-INSERTABLE AXIAL COMPONENT CODES

4.1 MACHINE SETUPS FOR STANDARD AXIAL COMPONENT INSERTION

This section applies to those components having less than 0.200-inch body diameter, 0.300- to 0.800-inch lead-mounting centers, and lead diameters of 0.015- to 0.035-inch. The primary means of differentiating between the various machine setups for inserting axial components is based on the type of insertion head used. The subheads that follow define the characteristics of each set-up.

4.1.1 Variable Center Distance (VCD) Setups

Setups designated VCD use an insertion head that has a variable center distance ranging from 0.300- to 0.800-inch.

VCD setups are capable of accepting any components that meet the specifications of insertion codes:

A	B	C
D	E	F
G	H	I
J	K	
M		O
P	Q	R
S	T	U
V		X
Y	Z	AA
AB	AC	AD
AE	AF	

4.1.2 BFVCD (Body Form Variable Center Distance) Setups

BFVCD setups use variable center distance insertion heads that have a fixed body forming tooling of 0.250-inch. It uses the following head-tooling numbers:

DEC #96-06597-00—BFVCD kit for third generation equipment
UIC #25068—BFVCD kit for fourth generation equipment

BFVCD setups are capable of accepting components that meet the specifications of insertion category K.

4.1.3 Depth Stop References

With the adoption of revision B of this specification, all references to DEPTH STOP will be those that are appropriate for Satellite and fifth-generation UIC equipment. The previous third-generation Depth Stop index will not be referenced to codes here, but may be cross referenced in section 11.

4.2 DETERMINING AND SELECTING AXIAL COMPONENT CODES

1. The determination of an axial component's machine-insertability is based on three of its dimensions:

   Body length less than 0.650 inch nominal
   Body diameter less than 0.200 inch
   Lead diameter 0.017 inch to 0.032 inch nominal

   When any of these parameters are exceeded, the part is considered hand-inserted and coded accordingly.

2. Elements for determining a code:

   A code represents four elements critical to the insertion process.

	Example: Code B represents
a. Minimum insertion span	0.400 inch
b. Nominal lead diameter	0.020 inch
c. Depth Stop	D
d. Polarity sensitivity	Yes

3. Compute the elements thus:

a. = Maximum body length ± 0.150 inch	a.____
b. = Nominal lead diameter	b.____
c. = Depth Stop from Table 3	c.____
Index = [(body diameter + lead diameter) / 2] - 0.028	
d. = Yes or No	d.____

4. Compare elements a-b-c-d with the elements and codes listed in Table 4, and select the appropriate code. If computations do not provide a match, a new code may be necessary. In such a case, contact the owner of this specification for further assistance.

Table 3: Depth Stop

Index	STOP
.000 - .011	A
.012 - .019	B
.020 - .027	C
.028 - .035	D
.036 - .043	E
.044 - .051	F
.052 - .059	G
.060 - .067	H
.068 - .075	I
.076 - .083	J

Table 4: 0.200-Inch Pitch Axial Insertion Codes

Minimum Span	Lead Diameter	Depth Stop	Polarity	Code	Description/Example
.300 inch	.017	C	No	_P	1/8-watt-CF-resistor
	.020	D	No	_Z	Case 12, CerCap, .022/.047-Cap
	.020	D	No	_K	10-01610-00 only (for BFVCD)
.400 inch	.020	D	Yes	_B	D07
	.020	D	No	_U	Case 13, CerCap
	.020	C	Yes	_C	D035
	.020	C	No	AB	
	.020	G	No	_Q	.22 CerCap
	.025	A	No	_E	Jumper wire
	.025	D	No	_A	1/4-watt-CC/CF, RN55 metal film resistor
	.032	D	Yes	_S	D041
	.032	G	Yes	_T	D015
.500 inch	.020	G	No	AC	Cap-(DaveFeres)
	.025	D	No	_Y	Axial-pico-fuse
	.032	D	No	_X	Axial-pico-fuse
.600 inch	.020	G	No	_O	1-watt, wire-wound resistor
	.020	G	Yes	_D	A case, tantalum
	.020	G	No	_V	Case 14, CerCap, 1-watt, wire-wound
	.020	H	No	AD	
	.020	I	No	_J	CerCap (tubular)
	.025	G	No	_H	RN60 metal film resistor
	.025	I	No	_M	Pla-Film + Foil-Cap
	.032	F	No	AA	1/2-watt, fuse resistor
	.032	G	No	_I	1/2-watt-CF/CC, ceramic bead choke
.700 inch	.020	D	No	_R	1-watt wire-wound resistor
.800	.020	H	No	AE	
	.020	I	Yes	_F	B case, tantalum
	.020	I	No	AF	
	.032	I	No	_G	1-watt metal oxide resistor

4.3 LARGE-BODIED AXIAL COMPONENT CODES

4.3.1 L-Series Codes

There was an attempt, in years past, to automate the insertion process for axial components with body diameters greater than 0.200 inch. Accordingly, a full set of codes, known as *L codes*, was released to accommodate these parts.

Economically, the process couldn't be justified in any module assembly plant, so the special set of insertion codes that was created for these parts became non-functional.

Any axial part with a body diameter greater than 0.200 inch that would have been a candidate for and L-series code should be considered a hand-assembly part and assigned a code from that category—specifically *HB* or *HC* —depending upon the part's polarity sensitivity.

Refer to head 9 for further information on hand assembly parts.

5 DUAL IN-LINE PACKAGE (DIP) COMPONENTS (0.300-INCH CENTERS)

5.1 GENERAL

All DIPs on 0.300-inch center spacing that meet the requirements of purchase specification A-PS-1900000-GS-0 can be used with insertion equipment. See Figures 1 and 2. The allowable ranges for 0.300-inch insertion span DIPs are listed in Table 5.

The insertability codes for this category of DIPs are made up of two digits. These two digits are determined by dividing the number of leads on each DIP in half. For example, a DIP with 14 leads would automatically fall into category 7.

Figure 1: Plastic/Ceramic Package (0.300-Inch Centers)

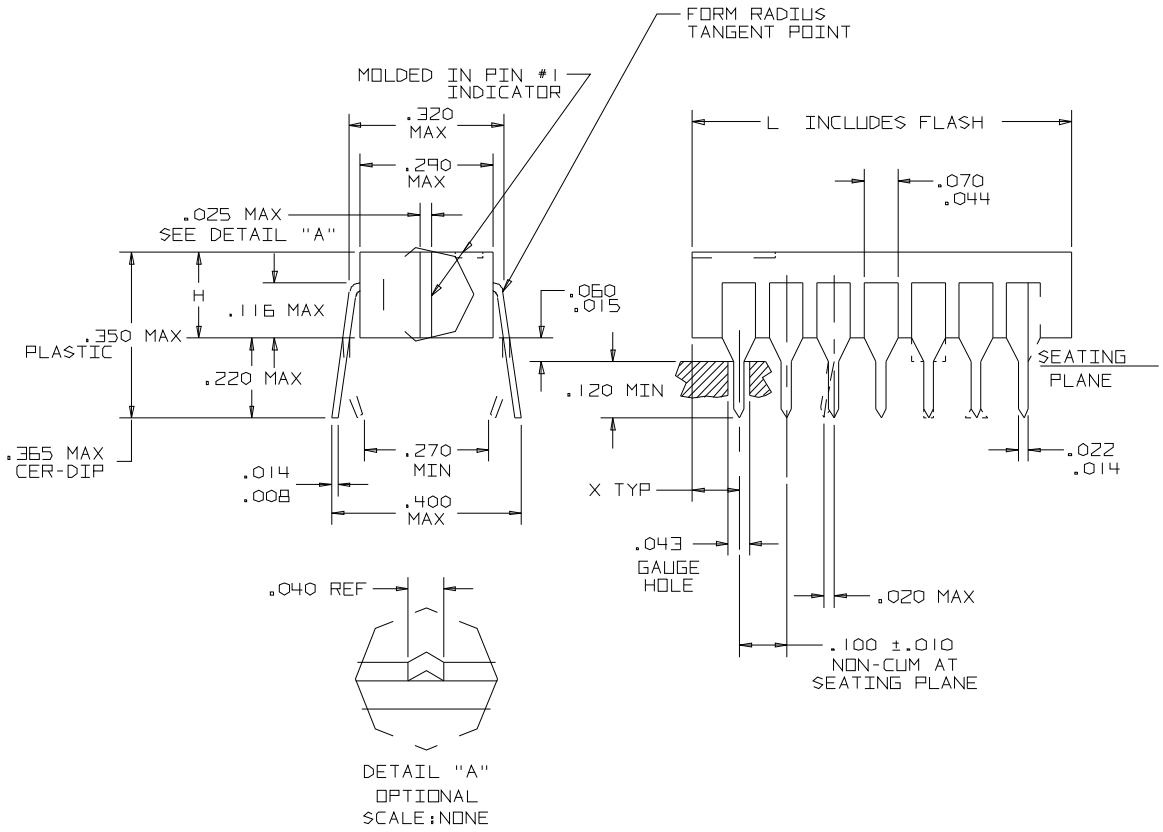


Figure 2: Side-Brazed Package (0.300-Inch Centers)

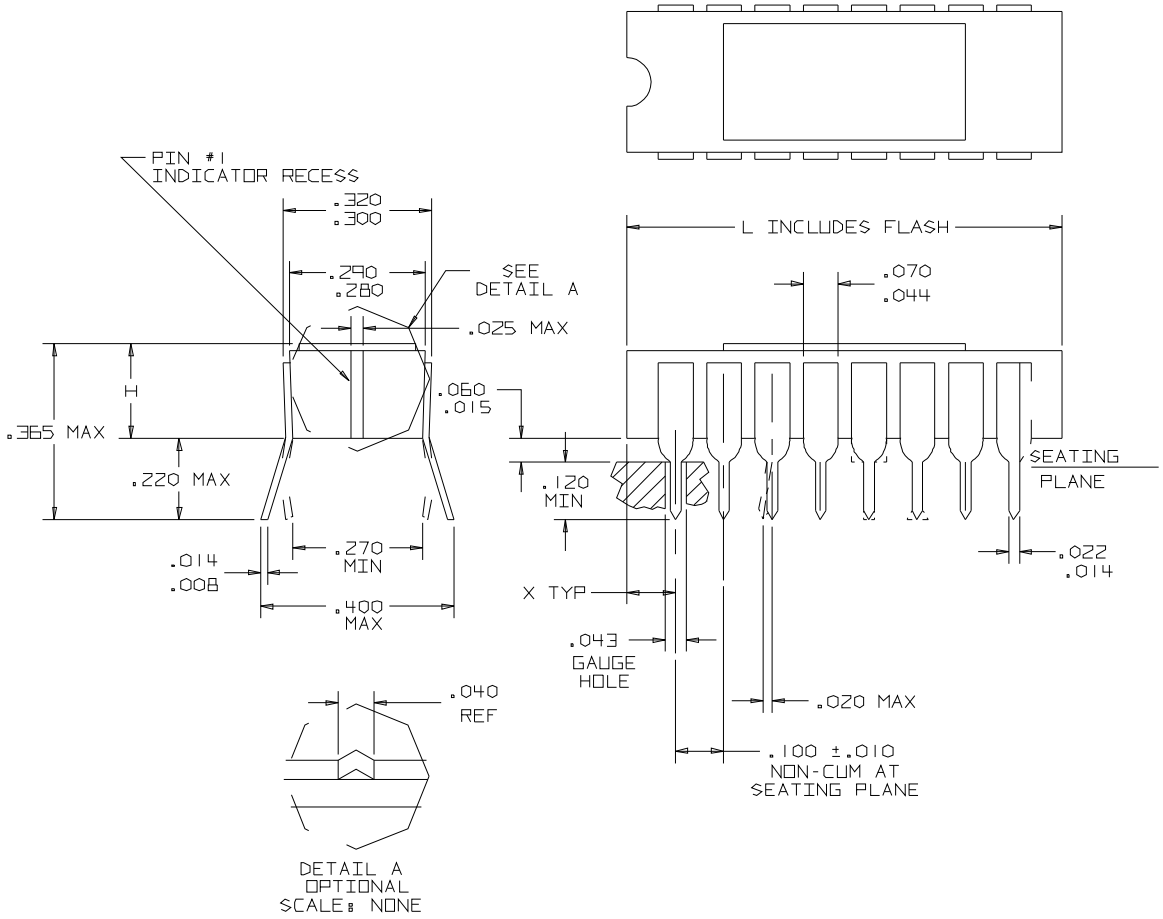


Table 5: Allowable Ranges for 0.300-inch Insertion Span DIPs (See Figures 1 and 2)

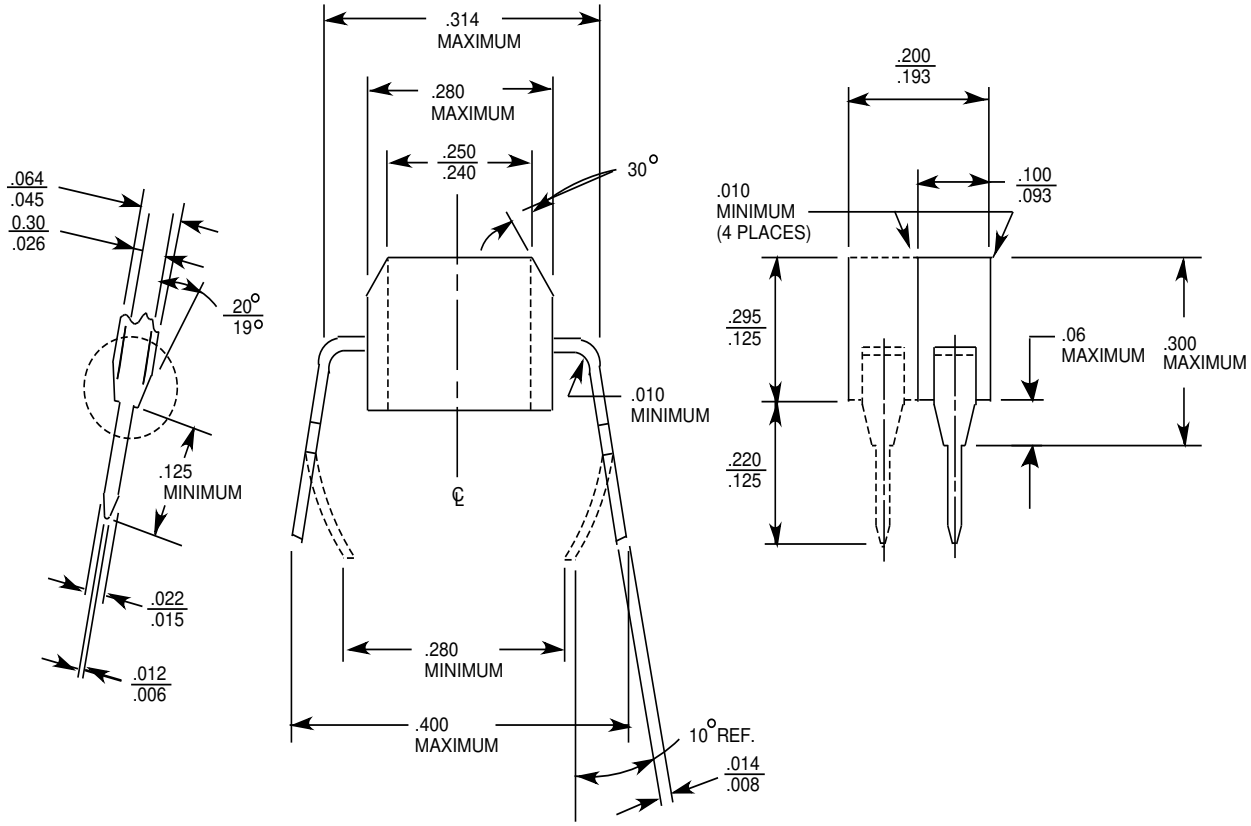
Insert	Pins	L		X		H	
Code		Min.	Max.	Min.	Max.	Min.	Max.
1	2	0.093	0.200	-	-	0.125	0.295
2	4	0.193	0.200	-	-	0.125	0.295
3	6	0.320	0.490	0.060	0.145	0.080	0.180
4	8	0.316	0.600	0.008	0.150	0.080	0.180
5	10	0.416	0.600	0.008	0.100	0.080	0.180
6	12	0.516	0.700	0.008	0.100	0.080	0.180
7	14	0.616	0.800	0.008	0.100	0.080	0.180
8	16	0.716	0.900	0.008	0.100	0.080	0.180
9	18	0.816	1.000	0.008	0.100	0.080	0.180
10	20	0.916	1.100	0.008	0.100	0.080	0.180
11	22	1.016	1.200	0.008	0.100	0.080	0.180
24	24	1.116	1.300	0.008	0.100	0.080	0.180

5.2 DUAL IN-LINE PACKAGE (DIP) COMPONENTS, 2- AND 4-PIN

All 2- and 4-pin DIPs on 0.300-inch center spacing, shown in Figure 3, that meet the requirements of this section may be potentially machine-insertable using available equipment.

The insertion codes for these components are determined by dividing the number of leads in half.

Figure 3: 2- and 4-Pin DIP Configuration Centered with Center Line of DIP Body Within 0.010-Inch



6 DUAL IN-LINE PACKAGE (DIP) COMPONENTS (0.400-INCH CENTERS)

All DIPs on 0.400-inch center spacing that meet the requirements of purchase specification A-PS-1900000-GS-0 may be potentially machine-insertable with available equipment. The insertability codes for DIPs with 0.400-inch spacing are determined as follows.

The insertion code consists of two digits. The tens digit is a 4 to indicate that the device has 0.400-inch center spacing and at least 20 leads. The actual lead count is obtained by adding 20 to the units digit of the insertion code.

Table 6 lists the allowable ranges for 0.400-inch insertion span DIPS.

Table 6: Allowable Ranges For 0.400-inch Insertion Span DIPs (See Figures 4 and 5)

Insert	Pins	L		X		H	
Code		Min.	Max.	Min.	Max.	Min.	Max.
42	22	1.106	1.200	0.008	0.100	0.080	0.180
44	24	0.116	0.300	0.008	0.100	0.080	0.180

Figure 4: Plastic/Ceramic Package (0.400-Inch Centers)

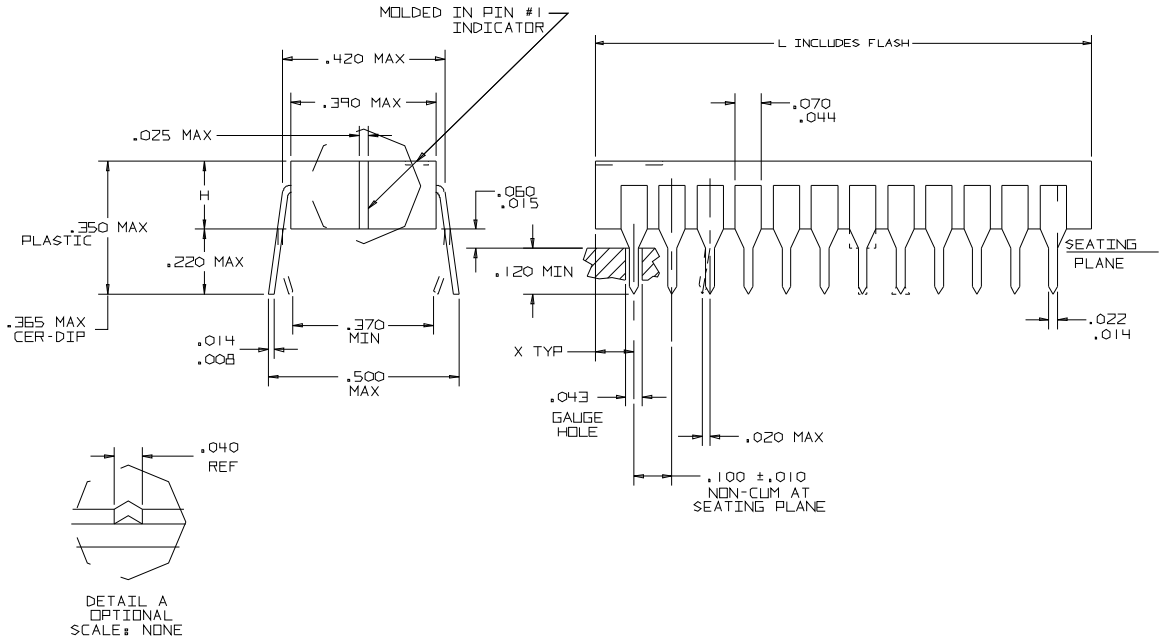
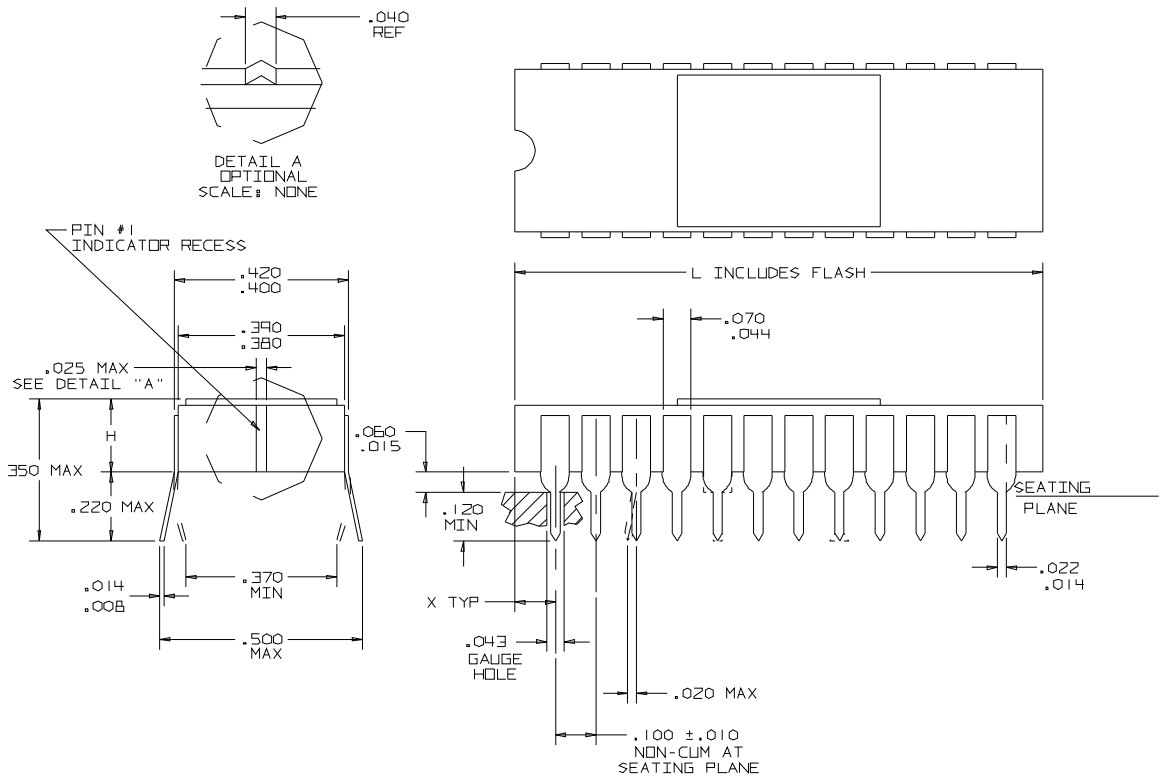


Figure 5: Side-Brazed Package (0.400-Inch Centers)



7 DUAL IN-LINE PACKAGE (DIP) COMPONENTS (0.600-INCH CENTERS)

All DIPs on 0.600-inch center spacing that meet the requirements of purchase specification A-PS-190000-GS-0 may be potentially machine-insertable using available equipment.

The insertion codes for DIPs in the 0.600-inch center-spacing category are determined by dividing the number of leads on the DIP in half.

Table 7 lists the allowable ranges for 0.600-inch DIPS.

Table 7: Allowable Ranges for 0.600-inch Insertion Span DIPs (See Figures 6 and 7)

Insert	Pins	L		X		H	
Code		Min.	Max.	Min.	Max.	Min.	Max.
12	24	1.116	1.250	0.008	0.075	0.080	0.180
14	28	1.316	1.450	0.008	0.075	0.080	0.180
16	32	1.516	1.700	0.008	0.100	0.080	0.180
18	36	1.716	1.850	0.008	0.075	0.080	0.180
20	40	1.916	2.050	0.008	0.075	0.080	0.180

Figure 6: Plastic/Ceramic Package (0.600-Inch Centers)

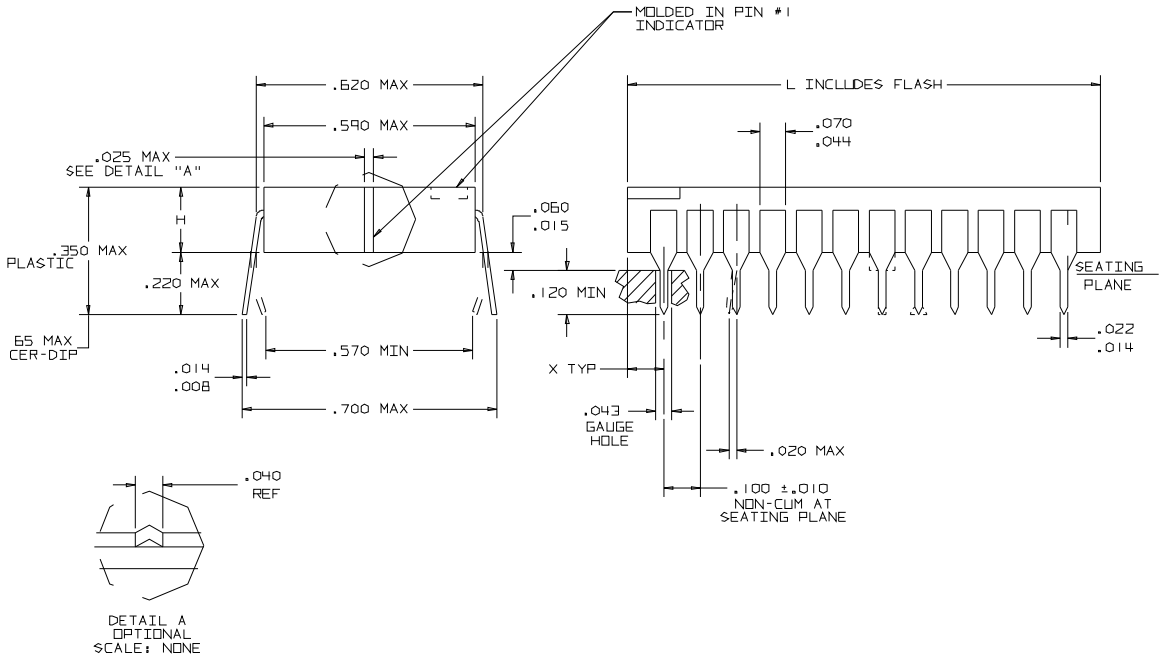
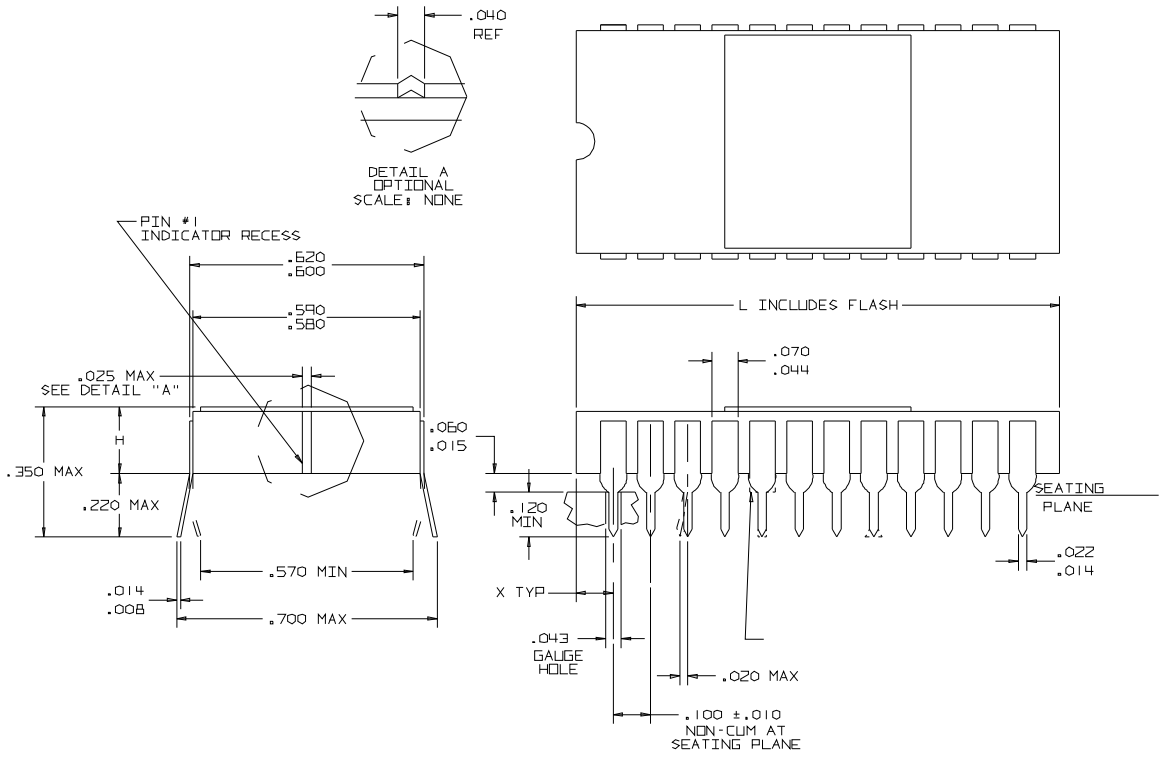


Figure 7: Side-Brazed Package (0.600-Inch Centers)



8 SOCKETS, DUAL IN-LINE

All DIP sockets that meet the requirements of this heading may be potentially machine-insertable using available equipment.

The insertability codes for DIP sockets are determined as follows. The left digit represents the center spacing. The letter on the right is obtained by dividing the number of pins by two, then using the letter of the alphabet that corresponds to that number.

Figure 8 illustrates a typical configuration for DIP sockets, with certain dimensions in inches and others left variable; precise values for these variable dimensions are listed in Table 8 in inches, for the various insertability codes.

Figure 8: Typical DIP Socket Configurations

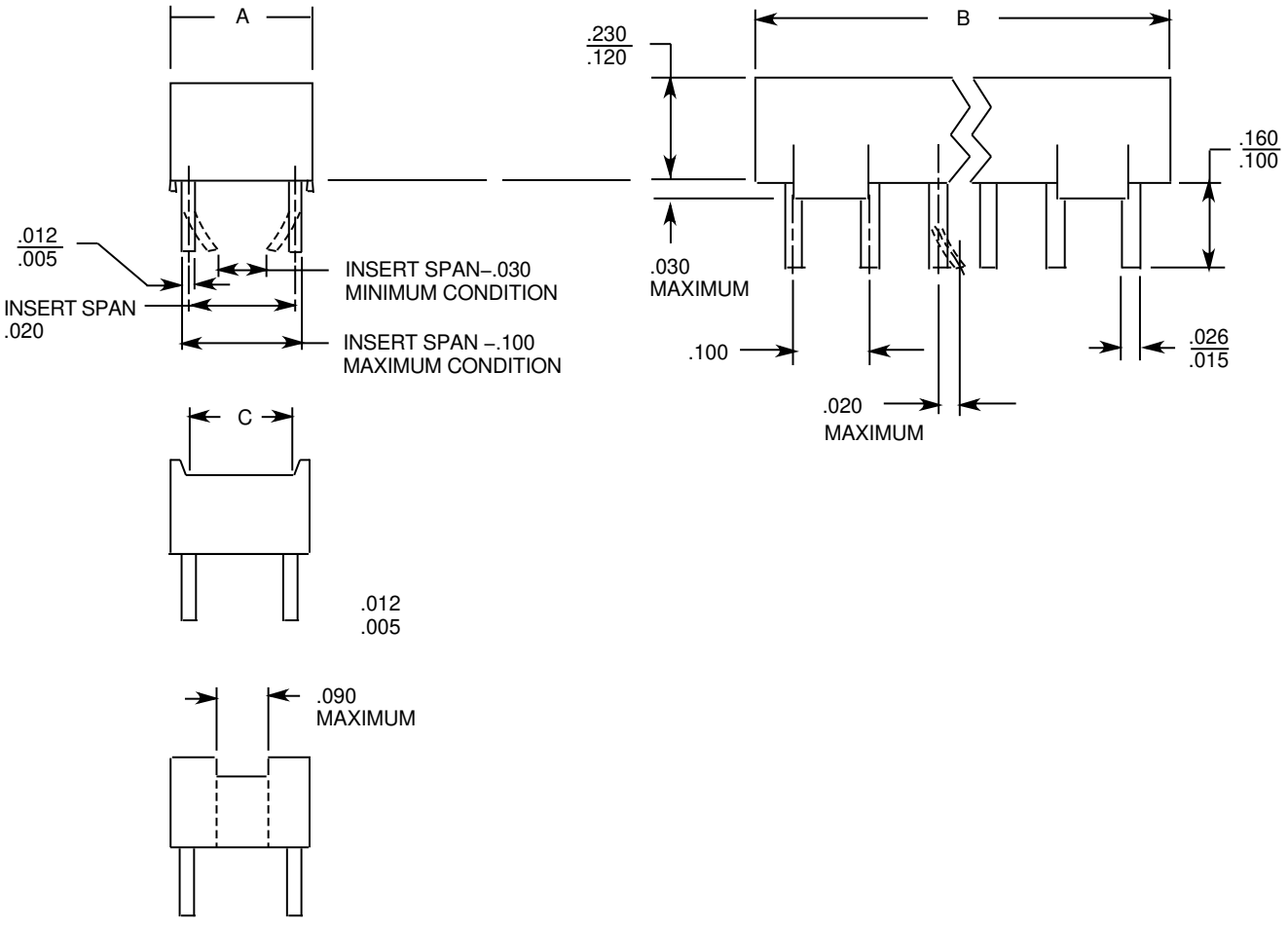


Table 8: Allowable Dimensions for Typical DIP Socket Configurations (See Figure 8)

			Allowable Dimensions			
Insert Code	Pins	Center Spacing	A Max.	B Max.	B Min.	C Max.
3A	2					
3B	4					
3C	6					
3D	8					
3E	10	0.300	0.410	1.000	0.300	0.300
3F	12	0.300				
3G	14	0.300				
3H	16	0.300				
3I	18	0.300				
3J	20	0.300				
3K	22	0.300				
3L	24	0.300				
4K	22	0.400	0.510	2.000	1.100	0.400
4L	24	0.400				
6L	24	0.600				
6N	28	0.600	0.710	2.000	1.100	0.600
6P	32	0.600				
6R	36	0.600				
6T	40	0.600				

9 HAND ASSEMBLY COMPONENTS

9.1 GENERAL

Most through-hole (leaded) components that are not candidates for machine automation by virtue of their package, and therefore were assigned a non-insertable code or had no code assigned at all, are to be considered as hand assembly parts, and coded accordingly.

This series of codes applies only to those parts that are through-hole related; that is, they have intrusive leads with which to mount them to a printed wiring board. The part's leads, specifically their number and orientation are the basis of this category scheme, as listed in Table 9.

Table 9: Hand Assembly Codes

Part Code	Insertion Pattern	Examples of Parts
HA	1 Lead	Berg pins, test-point pins, high-power diodes
HB	2 Leads	Large axial parts >.200-inch diameter, radial-lead parts
HC	2 Leads with polarity	HBs with polarity sensitivity
HD	3 Leads	Potentiometers
HE	3 Leads with polarity	Transistors (3-leaded)
HF	DIPs and DIP sockets	Non-machine-insertable DIPs
HG	SIPs and SIP sockets	
HH	ZIPs and ZIP sockets	
HI	4+ Leads	Transformers (small), header connectors
HJ	4+ Leads with polarity	HIs with polarity sensitivity
HK	PGAs, ceramic 100 $\times$ 100	
HL	PGAs, plastic 100 $\times$ 100	
HM	PGAs, 050 x 100 grid	
HN	Handles and ejectors	
HR	Heatsink; removable	
HS	Heatsink	

9.2 ASSIGNMENT PROCESS

The following steps represent the decision process that could be followed in order to decide on the proper code for a through-hole leaded part.

1. Is the part module-related, and does it fit into a category currently supported by automatic insertion equipment?
   such as DIPs, DIP sockets, axials <0.200-inch diameter

   a. Module-related parts... machine insertable codes
      _A - AF axial codes (0.200-inch pitch max.)
      _1 - 44 DIP codes (0.300-, 0.400-, 0.600-inch span)
      XY - XZ DIP non-insertable codes (may be re-assigned to HF)
      3A - 6T DIP socket codes (0.300-, 0.400-, 0.600-inch span)
      [ ]...Yes... Assign the proper code from subheads 4 - 8.
      [ ]... No ... continue to next step.

2. Is the part module-related, and identifiable by its lead configuration?

   b. Module-related parts... hand assembly presumed

HA	1 Lead
HB	2 Leads
HC	2 Leads with polarity
HD	3 Leads
HE	3 Leads with polarity
HF	DIPs and DIP sockets - Not machine-insertable
HG	SIPs and SIP sockets
HH	ZIPs and ZIP sockets
HI	4 or more leads
HJ	4 or more leads with polarity
HK	PGA, ceramic
HL	PGA, plastic
HM	PGA 050 x 100 grid
HN	Handles and ejectors
HR	Heatsink; Removable
HS	Heatsink

      [ ]...Yes... Assign the proper code from Table 9.
      [ ]...No ... continue to next step.

3. Generally the part is not directly applicable to modules. It could be used with other parts that are; but on its own, it does not warrant an *assembly* designation as a module component.

   c. Non module-related parts... no module application
      NA - Not applicable to modules
      [ ]...Yes... Assign the code "NA".

10 SURFACE MOUNT COMPONENT ONSERTION CODES

Refer to Table 11.

10.1 GENERAL

All surface mount technology components can have codes applied in a similar fashion as through-hole components. Onsertion code categories are based on the component package style, while individual codes within a category represent a change in one or a number of attributes, for example, lead count, lead style, lead pitch, body dimensions, and so forth.

Onsertion codes are assigned according to the data listed in Table 11.

10.2 SPECIFICATIONS

The general specifications that apply to SMT components, and by which this categorization system is generally based, are listed in Table 10.

Table 10: Surface Mount General Specifications

Specification Number	Subject
A-PS-1000105-GS-0	Ceramic chip capacitors
A-PS-1000106-GS-0	Tantalum chip capacitors
A-PS-1100006-GS-0	Switching diodes
A-PS-1100007-GS-0	Zener diodes
A-PS-1300013-GS-0	Chip resistors
A-PS-1300016-GS-0	SOJ
A-PS-1500004-GS-0	SOT transistors
A-PS-1900007-GS-0	CLCC
A-PS-1900013-GS-0	PLCC
A-PS-1900014-GS-0	LCCC
A-PS-1900017-GS-0	SOIC
A-PS-1900023-GS-0	PQFP
A-PS-1900031-GS-0	LDCC
A-PS-1900032-GS-0	SOJ
A-PS-1900034-GS-0	CerQuad

Table 11: Surface Mount Device Onsertion Codes

Package Category	Onsertion Code	Package Name	Lead Count	Lead Type	Lead Pitch	Package Mtl/Siz	Applicable General Specification
SOICs	BA	SOIC6	6	G	50	PL	
	BB	SOIC8	8	G	50	PL .150	19-00017-GS
	BT	SOIC8T Tall	8	G	50	PL .150	19-34861-xx
	BC	SOIC14	14	G	50	PL .150	19-00017-GS
	BD	SOIC16	16	G	50	PL .150	19-00017-GS
	BE	SOIC16L Lg	16	G	50	PL .300	19-00017-GS
	BF	SOIC20	20	G	50	PL .300	19-00017-GS
	BG	SOIC24	24	G	50	PL .300	19-00017-GS
	BI	SOIC28	28	G	50	PL .300	19-00017-GS
	BO	SOM-16	16	G	50	PL .220	13-00016-GS
	BP	SOM-20	20	G	50	PL .220	13-00016-GS
SOJs	BJ	SOJ16	16	J	50	PL	13-00016-GS
	BK	SOJ20	20	J	50	PL .300	19-00032-GS
	BL	SOJ24	24	J	50	PL .300	19-00032-GS
	BH	SOJ26	20/26	J	50	PL .300	21-00008-GS
	BU	SOJ26W	20/26	J	50	PL .350	21-00008-GS
	BM	SOJ28	28	J	50	PL .300	19-00032-GS
	BN	SOJ28W	28	J	50	PL .400	19-00032-GS
	BR	SOJ32	32	J	50	PL .300	19-00032-GS
	BS	SOJ32W	32	J	50	PL .400	19-00032-GS
	BQ	RCNET-16					
SSOPS	B1	SSOP48	48	G	25	PL .300	19-00045-GS
	B2	SSOP56	56	G	25	PL .300	19-00045-GS
PLCCs	DA	RES 16	16	J	50	PL	
Plastic	DB	PLCC18AA	18	J	50	PL	19-00013-GS
Leaded	DC	PLCC18LG	18	J	50	PL	⇓
Chip	DD	PLCC20	20	J	50	PL	
Carrier	DM	PLCC22R	22	J	50	PL	
	DE	PLCC28	28	J	50	PL	
	DN	PLCC28R	28	J	50	PL	
	DK	PLCC32	32	J	50	PL	
	DO	PLCC32R	32	J	50	PL	
	DF	PLCC44	44	J	50	PL	
	DL	PLCC52	52	J	50	PL	
	DG	PLCC68	68	J	50	PL	
	DH	PLCC84	84	J	50	PL	
	DP	PLCC100	100	J	50	PL	
	DQ	PLCC124	124	J	50	PL	

Table 11 (Cont.): Surface Mount Device Onsertion Codes

Package Category	Onsertion Code	Package Name	Lead Count	Lead Type	Lead Pitch	Package Mtl/Siz	Applicable General Specification
	DI	FLIO132	132	G	25	PL	
	DJ	FLIO164	164	G	25	PL	
CLCCs	EE	CLCC28	28	B	50	CE	19-00034-GS
Cerquad	EF	CLCC44	44	G	50	CE	⇓
	EG	CLCC68	68	G	50	CE	
	EH	CLCC84	84	G	50	CE	
	EI	FLIO132	132	G	25	CE	
	EJ	FLIO164	164	G	25	CE	
LDCCs	FH *	CCFP84	84	G	50	CE	19-00031-GS
Ceramic	FN *	CQFP100	100	G	50	CE	⇓
Quad	FI *	CCFP144	144	G	25	CE	
Flatpack	FJ *	LDCC164	164	G	25	CE	*
	FL *	CCFP172	172	G	25	CE	
	FM *	CCFP196	196	G	25	CE	
	FK *	LDCC224	224	G	25	CE	
SMPGAs	GD	SMPGA441	441	B	50	CE	
	GE	SMPGA561	561	B	50	CE	
PQFPs	QA	PQFP44	44	G	.8 mm	PL	19-00023-GS
	QB	PQFP60	60	G	.8 mm	PL	⇓
	QC	PQFP64	64	G	1.0 mm	PL	
	QD	PQFP80	80	G	.8 mm	PL	
	QE	PQFP100	100	G	.65 mm	PL	
	QF	PQFP120	120	G	.8 mm	PL	
	QG	PQFP144	144	G	.65 mm	PL	
	QH	PQFP144L	144	G	.65 mm	PL	
	QI	PQFP160	160	G	.65 mm	PL	
	QJ	PQFP184	184	G	.65 mm	PL	
	QK	PQFP208	208	G	.5 mm	PL	
	QL	PQFP132	132	G	25-mil.	PL	13-00016-GS
	QM	PQFP44W	44 Wide	G	1.0 mm	PL 14 mm	19-00023-GS
	QN	PQFP52	52	G	.65 mm	PL 10 mm	⇓
	QO	PQFP100L	100 Long	G	.65 mm	PL 20 × 14 mm	
	QP	PQFP120L	120 Long	G	.8 mm	PL 28 mm	

*Not recommended as of 26-Nov-1990

Table 11 (Cont.): Surface Mount Device Onsertion Codes

Package Category	Onsertion Code	Package Name	Lead Count	Lead Type	Lead Pitch	Package Mtl/Siz	Applicable General Specification
	QQ	PQFP160L	160 Long	G	.65 mm	PL 28 mm	
	QR	PQFP184L	184 Long	G	.65 mm	PL 32 mm	
	QS	PQFP232	232	G	.65 mm	PL 40 mm	
	QT	PQFP240	240	G	.5 mm	PL 32 mm	19-00023-GS

Package Category	Onsertion Code	Package Name	Component Assignments			Applicable General Specification
CHIPs	CA	0805	CerCap			10-00105-GS
	CB	1005	-			
	CC	1206	CerCap 1/4-watt resistor 10-00105-GS			13-00013-GS
	CD	1210	CerCap 1/2-watt resistor			10-00105-GS
	CE	1505	-			
	CF	1805	-			
	CG	1812	CerCap			10-00105-GS
	CH	1825	CerCap			10-00105-GS
	CI	2218	-			
	CJ	2225	-			
	CK	2622	-			
	CL	LQN3N	Inductor			
	CM	MELF 35	Diode			
	CN	MELF 41	Diode			
	CO	2512	1-1/2-watt resistor			
	CP	0612	CerCap (reversed 1206)			
	CQ	1808	CerCap			
	CR	2010	Resistor-jumper			
	CS	CASE Z	Tantalum capacitor, high-frequency type			10-00106-GS
	CT	CASE A	Tantalum capacitor, high-frequency type			10-00106-GS
	CU	CASE B	Tantalum capacitor, high-frequency type			10-00106-GS
	CV	CASE D	Tantalum capacitor, high-frequency type			10-00106-GS
	CW	CASE E	Tantalum capacitor, high-frequency type			10-00106-GS
	CX	CASE F	Tantalum capacitor, high-frequency type			10-00106-GS
	CY	CASE G	Tantalum capacitor, high-frequency type			10-00106-GS
	CZ	CASE H	Tantalum capacitor, high-frequency type			10-00106-GS
OTHERs	OA	SOT23	3	G	PL	11-00007-GS
	OB	SOT89	3	G	PL	
	OC	POT25	3	G		
	OD	OSC A	4	J	PL	

Table 11 (Cont.): Surface Mount Device Onsertion Codes

Package Category	Onsertion Code	Package Name	Lead Count	Lead Type	Lead Pitch	Package Mtl/Siz	Applicable General Specification
	OE	DPAK	2/3	G		PL	
	OF	XTAL-5	5	G	DIP can		18-23940-02
	OG	SMT DIP, 4-p .300/.430			DIP gull		16-17985-xx
	OH	THERM .12	2	B		MT	13-34316-01
	OI	THERM .7	2	B		MT	13-34315-01
	OJ	FUSE	2	J			
	OK	PWR RES WSC-2				J	13-34571-xx
	OL	PWR RES WSC-1				J	13-31987-xx
	OM	SMB-J, 403A-01				J	11-33298-xx
	ON	FERRITE BEAD				J	16-33297-01
	OO	EIA Case A Inductor				J	16-34136-xx
	OP	EIA Case B Inductor				J	16-34675-xx
	OQ	SMT DIP, 14-p, .050/.380			DIP gull		16-18343-xx
	OS	D2-PAK					
	OT	Tantalum, General Purpose EIA Case A 3216					10-00106-GS
	OU	Tantalum, General Purpose EIA Case B 3528					10-00106-GS
	OR	Tantalum, General Purpose EIA Case C 6032					10-00106-GS
	OV	Tantalum, General Purpose EIA Case D 7343					10-00106-GS
	OW	MA-506 Chip	4		J		
	OX	TO-220/16A					
	OY	SMC, DO-214AB					Chip
	OZ	Crystal, HC49U					
	PA	1008 Chip; inductor					16-39429-xx
	PB	SMT DIP, 4-p, .400/.430			DIP gull		16-28839-xx
	PC	SMT DIP, 8-p, .100/.420			DIP gull		16-35146-01
	PD	SMT DIP, 20-p, .100/.390			DIP gull		16-26311-01
	PE	SMT Chip; WCS-1/2					
	PF	SMT DIP, 12-p, .100/.390			DIP gull		
	PG	SMT DIP, 16-p, .100/.390			DIP gull		
	PH	SMT PKG, 4-pin/.200-pitch			C-leads		
	PI	SMT Chip; 0603					10-00105-GS

Leads: J = J-Bend
G = Gull-Wing
L = Leadless
B = Butt
Material: PL = Plastic
CE = Ceramic
MT = Metal

11 CROSS-REFERENCE CHARTS

11.1 STANDARD AXIAL COMPONENTS (0.200-INCH PITCH) DEPTH STOPS

Table 12: Depth Stop Conversion Table

Insertion Codes	Depth Stops							
Satellite and Fifth Generation VCD	D	C	G	A	I	F	H	
Third Generation VCD	A	B	C	D	E	F	G	H
_|A	X							
_|B	X							
_|C		X						
_|D			X					
_|E				X				
_|F					X			
_|G					X			
_|H			X					
_|I			X					
_|J					X			
_|K	X							
_|M					X			
_|O			X					
_|P		X						
_|Q			X					
_|R	X							
_|S	X							
_|T			X					
_|U	X							
_|V			X					
_|X	X							
_|Y	X							
_|Z	X							
A|A						X		
A|B		X				X		
A|C			X					
A|D							X	
A|E							X	
A|F					X			

APPENDIX A 0.200-PITCH MACHINE-INSERTABLE AXIAL COMPONENT CODES (HISTORICAL REFERENCE)

Table A-1 shows component critical dimensions for machine insertion and how their ranges create the variety of current insertion codes.

Allowances in ranges: W = 0.300 - 0.800 Insertion Span; X = 0.000 - 0.650 Body Length; Y = 0.015 - 0.200 Body Diameter; Z = 0.015 - 0.035 Lead Diameter.

Table 13: Component Critical Dimensions for Machine Insertion

Component Category Example	X Body Length	W Mounting Center	Z Nom. Lead	Y Body Diameter	Depth Stop	Polarity Sensitive	Insertion Code
1/8-watt resistor carbon film	.130 - .170	.300	.017	.057 - .071	B	No	_P
.047-µf capacitor .022-µf capacitor	.150 - .170	.300	.020	.070 - .100	A	No	_Z
*.01-µf axial lead capacitor[1]	.150 - .170	.300	.020	.070 - .100	A	No	_K
.01 disc capacitor	n/a	n/a	n/a	n/a	n/a	n/a	_L
D07 diode	.250 max.	.400	.020	.085 - .107	A	Yes	_B
case 12 ceramic capacitor	.150 - .260	.400	.020	.070 - .100	A	No	_U
D035 diode	.200 max.	.400	.020	.060 - .090	B	Yes	_C
- - -	.280 max.	.400	.020	.058 - .098	B	No	AB
.22-µf capacitor	.250 max.	.400	.020	.130 - .150	C	No	_Q
Jumper	0	.400	.025	.023 - .027	D	No	_E
1/4-watt c.c. 1/4-watt c.f. rn55 m.f. jumper ins	.295 max.	.400	.025	.080 - .100	A	No	_A
D041	.160 - .205	.400	.032	.080 - .107	A	Yes	_S
D015	.230 - .300	.400	.032	.104 - .140	C	Yes	_T
Pico fuse	.250 - .312	.500	.025	.083 - .103	A	No	_Y
Pico fuse	.250 - .312	.500	.032	.083 - .103	A	No	_X
- - -	.300 max	.500	.020	.150 max.	C	No	AC
1-watt wire-wound	.400 max.	.600	.020	.124 - .148	C	No	_O

[1]No other Digital part number can be assigned this insertion code due to tooling changes required for insertion span on 0.250-inch. The CISF software calculates the Nominal lead diameter as 0.032-inch rather than actual 0.020-inch.

Table 13 (Cont.): Component Critical Dimensions for Machine Insertion

Component Category Example	X Body Length	W Mounting Center	Z Nom. Lead	Y Body Diameter	Depth Stop	Polarity Sensitive	Insertion Code
Case A tantalum	.260 - .334	.600	.020	.130 - .151	C	Yes	_D
Case 14 ceramic capacitor	.380 - .450	.600	.020	.130 - .150	C	No	_V
Tubular ceramic capacitor	.404 - .450	.600	.020	.130 - .200	E	No	_J
RN60 m.f.	.450 max.	.600	.025	.120 - .160	C	No	_H
Capacitor pl.f.	.250 - .450	.600	.025	.150 - .200	E	No	_M
1/2-watt resistor fuse resistor	.320 - .280	.600	.032	.109 - .134	F	No	AA
1/2-watt resistor ceramic choke	.344 - .450	.600	.032	.128 - .160	C	No	_I
1-watt resistor wire-wound	.531 max.	.700	.020	.100 - .125	A	No	_R
Case B tantalum	.448 - .572	.800	.020	.180 - .201	E	Yes	_F
1-watt metal oxide	.600 max.	.800	.032	.138 - .178	E	No	_G

APPENDIX B REFERENCED DOCUMENTS

B.1 EL-Class Digital Documents

EL-Class Number	Document Title
EL-00059-00	*DEC STD 059-0 Incoming Inspection Requirements*
EL-00156-00	*DEC STD 156-0 Introducing New Purchased Parts and Maintaining Purchased Parts Information: Standard Procedures*

Use VTX SMC to order copies of EL-class documents from Standards and Methods Control. Send distribution questions to JOKUR::SMC or call DTN: 234-4423.

B.2 Other Digital Documents

Document Number	Document Title
A-PS-1000002-GS-0	*150D Solid Tantalum Capacitors*
A-PS-1012084-GS-0	*Miniature Aluminum Electrolytic Capacitors*
A-PS-1012784-GS-0	*.047 uF Ceramic Capacitors*
A-PS-1013466-GS-0	*Monolithic, Ceramic Axial Capacitors*
A-PS-1017472-00-0	*Miniature Aluminum Electrolytic Capacitors*
A-PS-1017897-01-0	*.22 uF Ceramic Capacitors*
A-PS-1019343-01-0	*Ceramic Non-Polar Capacitor*
A-PS-1100004-GS-0	*Non Dual-In-Line Semiconductor (D0 Case) Diodes*
A-PS-1118820-00-0	*D015 Diode*
A-PS-1210929-00-0	*Pico Fuse - Axial Lead*
A-PS-1210929-01-0	*Pico Fuse - Axial Lead*
A-PS-1210929-02-0	*Pico Fuse - Axial Lead*
A-PS-1210929-03-0	*Pico Fuse - Axial Leads*
A-PS-1210929-04-0	*Pico Fuse - Axial Lead*
A-PS-1300000-GS-0	*Carbon Composition Resistors, General Specification*
A-PS-1300001-GS-0	*Metal Film Resistors, General Specification*
A-PS-1300004-GS-0	*Wire Wound Resistors, General Specification*
A-PS-1300009-GS-0	*Carbon Film Resistors, General Specification*
A-PS-1300010-GS-0	*Metal Oxide Resistors, General Specification*
A-PS-1300013-GS-0	*Chip Resistors, General Specification*
A-PS-1900000-GS-0	*Dual-In-Line Packages, General Specification*
A-PS-1900023-GS-0	*PQFP, General Specification*
A-PS-1900031-GS-0	*LDCC, General Specification*
A-PS-1900032-GS-0	*Plastic SOJ Packages, General Specification*
A-PS-1900034-GS-0	*Cerquad Packages, General Specification*
A-PS-9009185-00-0	*Insulated Jumpers*

Document Number	Document Title
A-PS-9010430-00-0	*Jumper Wire*

B.3 ORDERING INFORMATION

Copies of purchase specifications can be obtained from the SPOC System. Contact Central Specification Control Systems (CSCS), NRO5/M2, for assistance.

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